

Name: Index No.

School: Candidate's Sign.

Date:

233/2

CHEMISTRY

PAPER 2

MARCH/APRIL 2011

TIME: 2 HOURS

BUTERE EAST ZONE JOINT EVALUATION TEST

Kenya Certificate of Secondary Education (K.C.S.E.)

Chemistry
Paper 2

INSTRUCTIONS TO THE CANDIDATES:

- Answer *all* the questions in the spaces provided.
- All working **must** be clearly shown where necessary.
- Mathematical tables and non-programmeable electronic calculators may be used.

Question	Maximum score	Candidate's score
1	16	
2	12	
3	11	
4	12	
5	14	
6	10	
7	5	
Total	80	

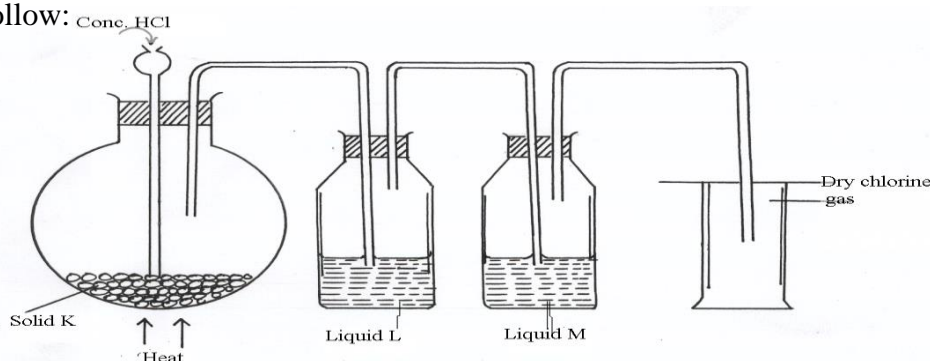
This paper consists of 8 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.

1. Use the grid below to answer the questions that follow. Letters do not represent the actual symbol of the elements.

F	I		M	O	
G	J	K	L	N	P
H					

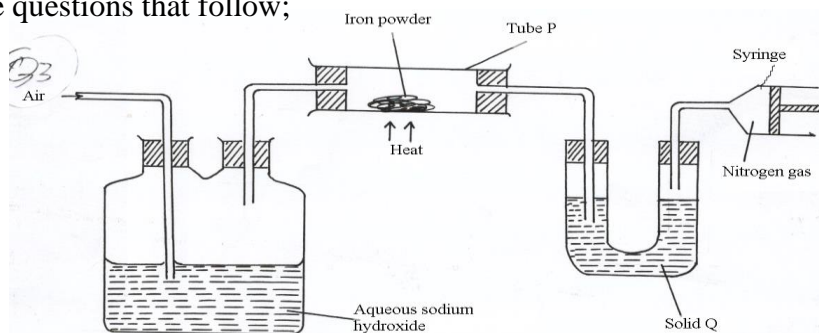
- (a) What family name is given to elements **G** and **H**? (1mk)
- (b) State and explain the difference in reactivity between:
 (i) **G** and **J** (2mks) (ii) **N** and **P**
- (c) How does atomic radius of **K** compare to that of **L**? Explain. (2mks)
- (d) Element **R** forms an oxide of the formula RO_2 and belongs to period 2. Indicate in the grid the position of **R**. (1mk)
- (e) Explain the trend in melting points in the group of elements to which **I** and **J** belong. (2mks)
- (f) Write down the formula of the compound formed between **K** and **P**. (1mk)
- (g) Name the type of bond formed when **F** reacts with **O**. Explain. (2mks)
- (h) Give **one** use of element **Q**. (1mk)
- (i) Write down the electronic arrangement of ion of ; (2mks)
- H**..... **N**.....

2. Below is a set up of apparatus used to prepare and collect dry gas. Study it and answer the questions that follow:



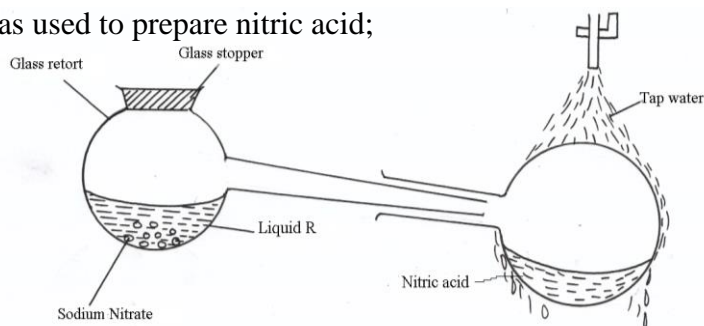
- (a) Name:
 (i) Solid **K** (1mk) (ii) Liquid **L** (1mk) (iii) Liquid **M** (1mk)
- (b) What is the role of;
 (i) Liquid **L** (1mk) (ii) Liquid **M** (1mk)
- (c) State and explain **one** precaution that must be taken during the preparation of chlorine. (2mks)
- (d) What property of chlorine makes it be collected as shown above? (1mk)
- (e) Write an equation for the reaction that leads to the formation of chlorine in the above experiment. (1mk)
- (f) In a separate experiment, when dry chlorine gas was passed over sodium metal. 11.7g of sodium chloride were deposited. Calculate the volume of chlorine that completely reacted with sodium at r.t.p. (Molar gas volume at r.t.p = 24dm^3 , Na = 23, Cl = 35.5) (3mks)

3. (a) The diagram below represents a set up used to obtain dry nitrogen from air. Study and answer the questions that follow;



- (i) Name solid **Q**..... (1mk)
- (ii) What is the role of aqueous sodium hydroxide? (1mk)
- (iii) Write an equation for the reaction that takes place in tube **P**. (1mk)
- (iv) **Name one** impurity in the nitrogen gas collected. (1mk)

(b) The set up below was used to prepare nitric acid;



(i) Give the name of liquid **R**(1mk)

(ii) Write an equation for the reaction which takes place in the retort flask. (1mk)

(iii) Explain the following;

(a) Nitric acid is stored in dark bottles. (1mk)

(b) The reaction between copper metal and 50% conc. Nitric acid (one volume of nitric acid with an equal volume of water) in an open test tube give brown fumes. (2mks)

(iv) A factory uses nitric acid and ammonia gas as the only reactants for preparation of fertilizer. If the daily production of the fertilizer is 9,600kg, work out the mass of ammonia gas used daily in kg. (N = 14.0, O = 16.0, H = 1.0) (3mks)

4. The table below shows how the solubilities of three salts vary with temperature. Use it to answer the questions that follow:

Temperature		0	10	20	30	40	50	60	70
Solubility g/100g H ₂ O	KNO ₃	12.5	22.5	32.5	47.5	62.5	82.5	112.5	137.5
	Pb(NO ₃) ₂	37.5	45.0	52.5	62.5	70.0	77.5	87.5	100.0

(a) On the same set of axes, plot a graph of solubility of the two salts (y-axis) against Temperature. (4mks)

(b) From the graph, determine:

(i) the temperature at which the solubility of potassium nitrate and lead nitrate is the same (1mk)

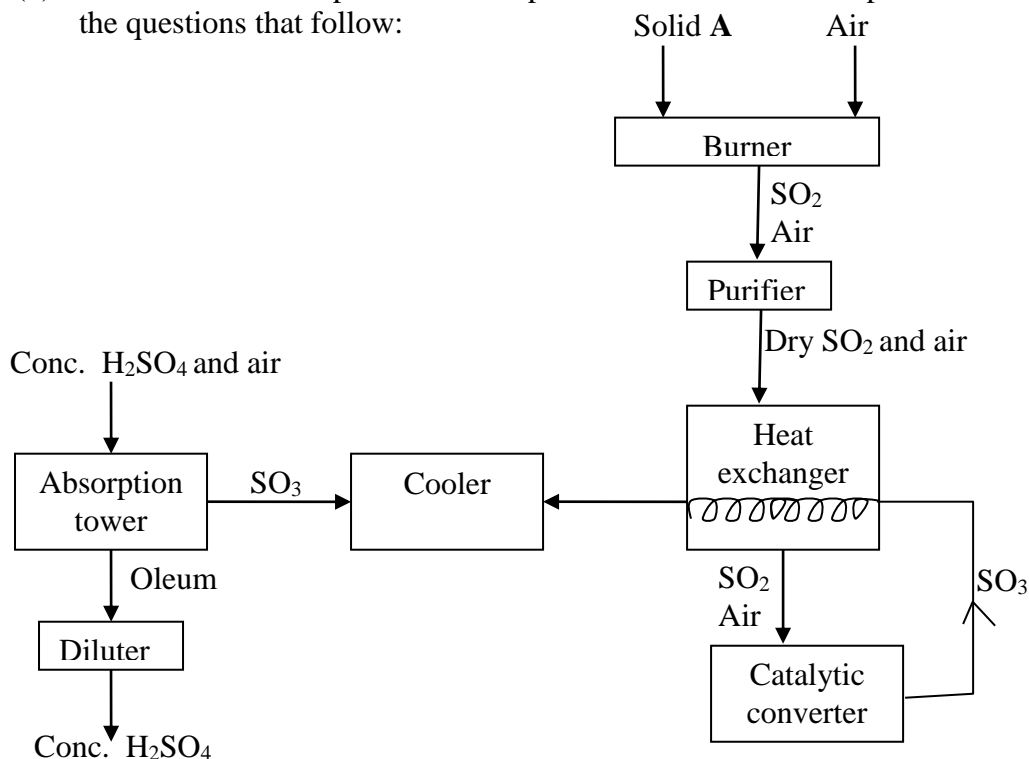
(ii) the moles of lead nitrate that would dissolve in one litre of water at 25°C (density of water = 1g/cm³, Pb = 207, N = 14, O = 16) (3mks)

(iii) A solution of potassium nitrate is cooled from 45°C to 15°C. Determine the mass of the crystals formed. (2mks)

(c) What is **fractional crystallization**? (1mk)

5. (a) Name **two** crystalline forms of sulphur. (2mks)

(b) The scheme below represents the steps followed in the contact process. Study it and answer the questions that follow:

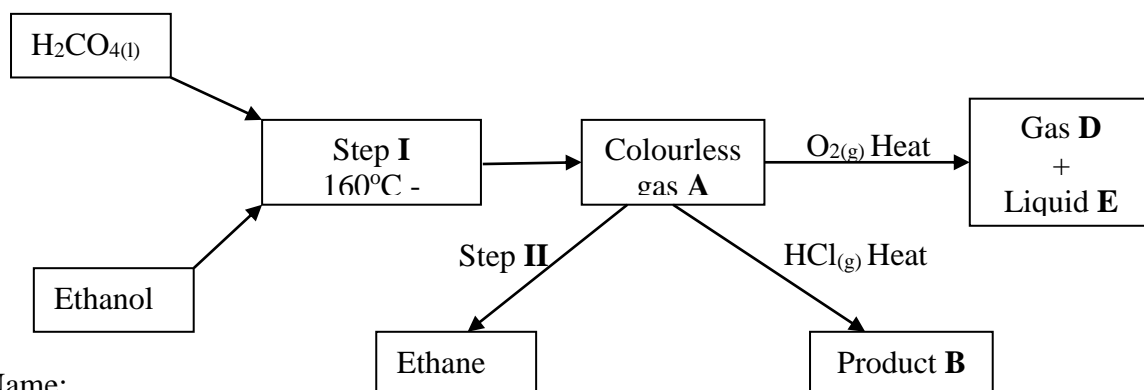


- (i) Name **two** possible identities of solid **A**. (2mks)
- (ii) Name **one** impurity removed in the purifier. (1mk)
- (iii) Why is it necessary to remove impurities? (1mk)
- (iv) Write down the equation of the reaction taking place in the converter.
- (v) (a) Name the **two** catalysts that can be used in the converter. (2mks)
- (b) What is the function of the heat exchanger? (1mk)
- (vi) Sulphur (VI) oxide is not dissolved into water? Explain. (1mk)
- (vii) (a) Name the **main** pollutant in the contact process. (1mk)
- (b) How can the pollution in g(i) above be controlled? (1mk)
- (viii) Give **one** use of sulphuric (VI) acid. (1mk)

6. Given that;

- (i) Enthalpy of combustion of Carbon (graphite) = -393KJmol^{-1}
- (ii) Enthalpy of combustion of carbon (ii) oxide = -283KJmol^{-1}
- (a) Write down the thermo chemical equations for the combustion of:
 - (i) Carbon (graphite) (1mk)
 - (ii) Carbon (ii) Oxide (1mk)
- (b) By incorporating the two equations in (a) above, draw:
 - (i) An energy level diagram for the formation of Carbon (IV) oxide (2mks)
 - (ii) An energy cycle diagram for the reaction. (2mks)
- (c) Using your answers in (b) above, determine the enthalpy of formation of carbon (ii) oxide. (2mks)
- (d) When 8.0g of sulphur is completely burned in oxygen in a calorimeter, the heat evolved raises the temperature of 500cm^3 of water by 35°C . Calculate the heat of combustion of sulphur. (The specific heat capacity of water = $4.2\text{KJkg}^{-1}\text{K}^{-1}$, $S = 32$). (2mks)

7. Study the reaction scheme below and answer the questions that follow:



- (a) Name;
 - (i) colourless gas **A** (½mk)
 - (ii) Product **B** (½mk)
 - (iii) Gas **D** (½mk)
 - (iv) Liquid **E** (½mk)
- (b) Write balanced equations for the reactions forming **D** and **E** only. (1mk)
- (c) Name the type of reaction taking place in **I** and **II**. (1mk)
- (d) State the importance of the reactions taking place in step **II**. (1mk)